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Washington Highlights

No greater influence over the domestic petroleum industry than it now holds will accrue to the Federal Government if the proposed Anglo-American oil treaty becomes law.

This is the considerate opinion of Charles Fahy, State Department legal advisor.

He told the Senate Foreign Relations Committee that he did not believe the treaty would bring about Government control of the country's oil business.

"In view of the reservations suggested by the American Petroleum Institute," he stated, "Congress could not regulate or control the domestic industry in excess of the power it now has and the states will retain the powers they now have. The only change will be that the Government under Article 2 would make representations to any state that has an inconsistent policy and I think that is as far as the Government could go."

Under the provisions of Article 2, signatory governments will carry on their respective oil activities in a manner that will not offer impediments to the treaty's aim of facilitating conformable development of the international petroleum trade.

The "reservations" voted by the A. P. I. were designed to prevent interference or control of the home oil industry.

Many oil men fear the agreement as the first step toward ultimate control of the industry by the Government or international regulations. Others analyze the treaty as eventually leading to various kinds of cartels and monopolies. This attitude is particularly true of independent members of the industry.

The Supreme Court has upheld the Federal Government's claim to ownership of certain oil lands in Section 36 in Park County, Wyoming, which have been under development by Ohio Oil Co.

Both the State of Wyoming and Ohio Oil Co. contested the Federal Government's claim. Wyoming claimed the ground in question under an act in 1890 which admitted the state to the Union. Ohio Oil Co. operated under leases granted by Wyoming. The leases embrace 640 acres.

There is no denying that many of the nation's oil leaders regard with considerable anxiety the monotonous cry of "shortage" coming from a segment of the industry in all parts of the country whenever the supply and demand position is discussed.

Oil observers here regard the vocal clamor as aiding the cause of those favoring nationalization or further and drastic control of the industry.

Production in United States is at a record high. In recent weeks it has been running above 5,000,000 barrels a day. Demand also continues to climb, with refineries turning out more products than ever before.

All branches of the industry are gearing to an even greater demand in 1948. Fabulous expenditures are being made for exploratory campaigns, new refineries and facilities for storage and distribution.

During the war certain regulations and material restrictions necessary to adequately supply military needs did not permit the industry time off to plan for peace years.

Many of the country's oil executives have pointed out that all phases of oil have now been adjusted to normal practices and with needed facilities available, the full might of the industry is ready to reach out and assure satisfaction of any demand.

President Truman has requested Congress to approve a 4-year extension of the 16-state Interstate Compact to conserve oil and gas.

The compact, which expires September 1 if not officially extended, sets forth a pattern of regulations for proper administration by the several states for conservation of petroleum.

Signatories to the compact, which has been extended three times, are Alabama, Arkansas, Florida, Kansas, Louisiana, Montana, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Texas, West Virginia, Tennessee and Indiana. The latter signed and joined the compact only last April 28.

The conservation agreement was originally executed in 1935 by half a dozen states.

Joel D. Wolfsohn, associate director of the Bureau of Land Management, resigned June 1. Widely known to oil and gas producers and an authority on public lands, he plans to go to Paris, France, as an official of the American Jewish Committee.

Control of Unconsolidated Sands in the Wilmington Oil Field

Read Winterburn
Union Pacific Railroad Co.

Production from the Tar, Ranger, and Upper Terminal zones in the Wilmington Field has been difficult and expensive because of the fine, unconsolidated nature of the sand in these zones. This sand heaves into the well, sanding up pump and liner and necessitates frequent cleanout jobs. It enlarges perforations by abrasion and often causes collapse of liners. Most wells which produce appreciable quantities of sand eventually reach a condition which necessitates redrilling and installation of new liners in order to maintain the wells on production.

Much thought and effort have been directed toward the solution of this problem, and the published material covers the experimental background and most of the equipment and practices which have been applied to the field.

Two Methods for Sand Control

The efforts to control sand have fallen under two general headings: (1) Control of the flow of fluid into the well so as to prevent the entrance of excessive quantities of sand, and (2) The use of a liner which will effectively screen the sand.

The control of flow of fluid into the well consists mainly of preventing surging and excessive velocities. Efforts to accomplish this have consisted in restricting production rate, providing a maximum area of perforations for fluid entry, producing with tubing near the bottom of the zone to prevent filling the liner with sand, or pumping, with tubing high to maintain constant back pressure against the sand. C. J. Dean (1) has discussed many of these factors in detail.

Screening of sand has been attempted by the use of slots and round holes of the smallest available dimensions, by pumping gravel of a selected size into the annulus between the perforated liner and the walls of the hole, or by "prepacking" the liner before it is run in the well by filling the annulus between the liner and a perforated outer sheath with gravel.

Factors Affecting Sand Control

C. J. Coberly and E. M. Wagner (2) have presented extensive experimental work in which they determined that a slot width of twice the grain size at the 10 precentile point on the cumulative screen analysis will effectively screen the sand. On this basis the finer sands in the Wilmington Field would require a 20-mesh slot.

Kenneth E. Hill (3), B. Gumperts (4) and Coberly and Wagner (5) have presented the results of extensive experimental work relative to the proper ratio of gravel size to the sand grain size at the 10 percentile point on the cumulative screen analysis. The conclusions arrived at in this work varied in the recommended gravel size from 8 to 13 times (for the coarsest gravel in the mixture) the 10 percentile sand grain size. These experiments indicated that velocity of fluid movement affects the ratio between the grain sizes of gravel and sand which is needed for formation of stable bridges. Velocities in producing wells are much lower than those used in the experiments.

Actual experience in the field has shown that sand entry can virtually be eliminated by use of a gravel, the finest 50% of which is approximately 10 times the grain size of the ten percentile of the finest sand to be screened.

Mud Cake Must Be Eliminated

Mr. Hill also presented evidence which supported his conclusion that gravel packed and prepacked wells had lower initial productive indices than comparable wells completed with conventional liners and that the decline in index was more rapid in gravel packed or prepacked wells which are designed to prevent entrance of all sand.

These effects are believed to be the result of failure to remove the wall cake before completion and the plugging which occurs during production due to the bridging of progressively finer material at the outer face of the gravel sheath.

Considerable experimentation was conducted with liners other than the 50, 60 and 80-mesh slots which were used in the early wells and the gravel packed and prepacked liners designed to effectively screen all sand. This experimentation was directed toward devising a liner installation which would prevent the serious sand trouble which developed in the early wells and at the same time avoid the plugging which occurred in many of the gravel packed and prepacked wells.

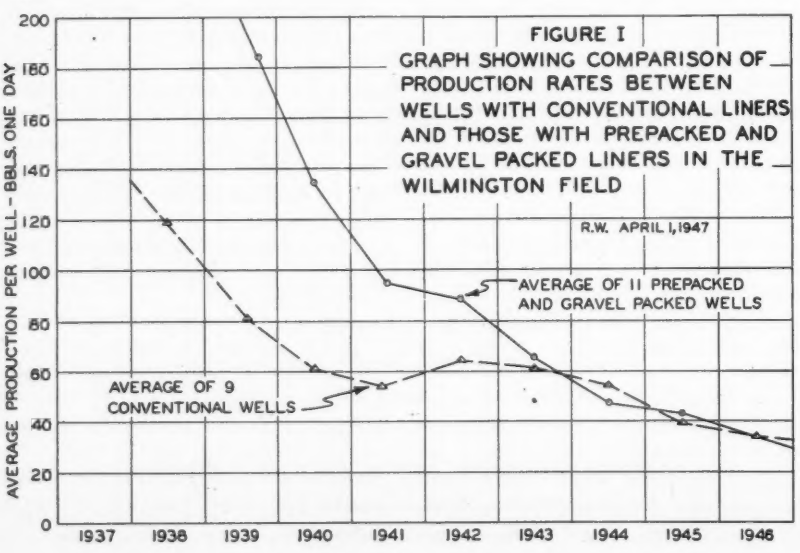


FIGURE I
GRAPH SHOWING COMPARISON OF PRODUCTION RATES BETWEEN WELLS WITH CONVENTIONAL LINERS AND THOSE WITH PREPACKED AND GRAVEL PACKED LINERS IN THE WILMINGTON FIELD

Gravel size in prepacked liners was increased from .093" - .131" to .187" - .250" and in gravel packed wells from .131" - .187" to .250" - .375". Liners with 30-mesh undercut slots and 3/32" round holes were also installed in a number of wells. One operator installed wire wrapped liners in four wells.

Some of the wells with each of these new types of liners produced sand initially and in a number of them it was necessary to bail or circulate sand from the hole. This had been anticipated but it was hoped that the production of limited amounts of sand would prevent the plugging which occurred with the gravel sizes previously used.

Wilmington Wells Studied

A total of 260 wells in the Wilmington Field have been studied in order to determine the effectiveness of various types of liner installations in preventing the trouble which results from sand production. In analyzing the performance of these wells it was decided to use the percentage of wells which have developed bad liners and the percentage which have been redrilled as criteria for determining the effectiveness of various types of liners. The results of this study are shown in Table I.

It will be noted that there is a wide discrepancy in the average length of time the various types of installations have been in use. It is further apparent that liner failures are continuing to occur among the early wells ten years after completion. Therefore it is necessary to compare the performance of the various types of liners on some basis which includes the time factor. To accomplish this, a tabulation has been prepared showing for each type of liber, the cumulative percentage of redrill jobs which were performed between completion and the end of each year following completion.

Effect of Pipe Slot Sizes

It will be noted from inspection of Table I that the 30-mesh slots, 3/32" undercut round holes and 0.250" - 0.375" gravel packs have a performance record which is not as good as that of the 60-mesh slots while 0.187" - 0.250" prepacked liners are very little better. On the other hand, gravel packed liners (those in which the gravel is pumped down around the outside of the liner) with 0.131" - 0.187" or smaller gravel, and prepacked liners with 0.093" - 0.131" or smaller gravel have required only about one-tenth the percentage of redrilling as the 60-mesh slots after seven years experience. The absence of redrilling with the 0.187" - 0.250" gravel packs and 0.131" - 0.187" prepacks is not considered conclusive because of the small number of wells involved. Experience with prepacks using 0.093" - 0.250" gravel to date indicates that results will be comparable to those obtained with 0.093" - 0.131". Although none of the four wells with 0.015" and 0.020" wire wrapped liners have been redrilled, two of them have made considerable sand and have developed bad pipe.

Some wells have recently been equipped with liners having slots of 0.015" - 0.025" width and are producing satisfactorily. However, the history on these liners is too short to justify conclusions. It is possible that sufficiently narrow slots or sufficiently small round holes will effectively screen the sand and can be more easily cleaned should they become plugged than can the gravel packed and prepacked liners.

Good Production Rates Maintained

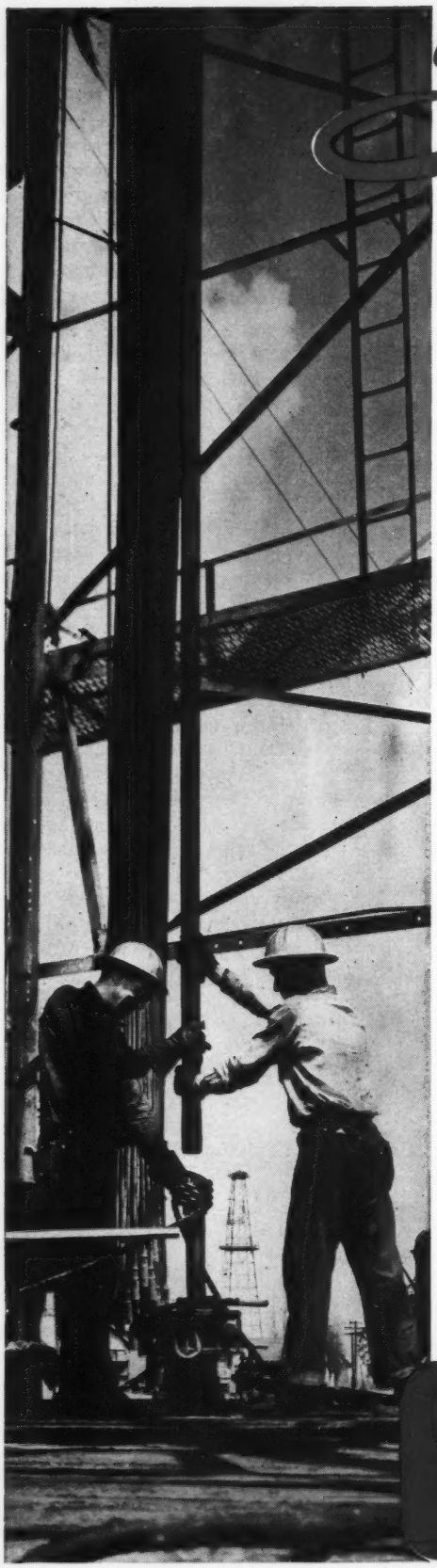
The foregoing review indicates that sand trouble can be successfully prevented in nearly all cases at Wilmington by using the proper size of gravel packed or prepacked liners. However, it has been observed that there is a more rapid decline in productivity of wells with these liners than is the case where conventional liners are used. This has been established by observation of the productive indices during the flowing life as reported by Hill (3) and Winterburn (6). Unfortunately, indices have been measured only during the flowing life so that the decline cannot be determined during recent years since the wells have been placed on the pump. However, the decline in actual production rates indicates that the same relation has continued.

In spite of this effect, study of production records shows that it has been possible to maintain higher rates of production for a number of years from wells equipped to effectively screen sand because it is not necessary to restrict the wells to avoid excessive sand production as it is in the case of those wells

TABLE I

Type of Liner	Total Wells	Time Since First Use	Number of Wells Known to Have Bad Pipe	%	Number of Wells Which Have Been Redrilled	%	Cumulative Percent of Redrills by the End of Each Year after Completion 1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %
I 60 M Slots	95	10 Yrs.	45	(47.4)	34	(34.8)	4	7	10	15	16	20	27	31	34	36
II 30 M Slots	10	2 Yrs. 7 Mos.	4	(40.0)	3	(30.0)	0	30	30							
III 3/32" R.H.	25	1 Yr. 10 Mos.	5	(20.0)	4	(16.0)	4	16								
IV Gravel Pack .093-.131 .131-.187	38	8 Yrs. 4 Mos.	2	(5.3)	1	(2.6)										
V Gravel Pack .187-.250	3	3 Yrs. 7 Mos.	0		0											
Total of IV and V	41		2	(4.9)	1	(2.4)	0	0	0	0	0	0	2			
VI Gravel Pack .250-.375	23	3 Yrs. 4 Mos.	4	(17.4)	3	(13.0)	4	9	13							
VII Prepack .093-.131	35	7 Yrs. 8 Mos.	2	(5.7)	1	(2.9)										
VIII Prepack .131-.187	2	7 Yrs. 8 Mos.	0		0											
IX Prepack .093-.250	8	10 Mos.	0		0											
Total of VII, VIII and IX	45		2	(4.4)	1	(2.2)	0	0	2	2	2	2	2			
X Prepack .187-.250	27	2 Yrs. 8 Mos.	3	(11.1)	2	(7.4)	4	7	7							
XI Wire wrapped Liners .015-.020	4	1 Yr. 3 Mos.	2	(50.0)	0											
	260															

Results of a study of 260 Wilmington Field wells to determine effectiveness of various types of liners.



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equipped with conventional liners.

Figure I shows the average production rate per well of two groups of wells to the end of 1946. The wells in the two groups are in the same fault block and zone and are comparable in all other ways except that the wells with conventional liners were completed from one to two years earlier than those in the other group and for this reason might be expected to have higher initial productivity. Inspection of this graph shows that the gravel packed and prepacked wells were produced initially at higher rates and declined more rapidly so that during 1946 the two groups produced at nearly equal rates.

Economic Considerations

In order to evaluate the economic aspects of using the two types of liners, the following comparison of the average well in these two groups has been made:

	Average per Well of 11 Gravel Packed & Prepacked Wells	Average per Well of 9 Conventional Wells
Length of Time on Production	7½ Yrs.	9 Yrs.
Recovery to Jan. 1, 1947—Bbls.	205,000	206,600
Recovery at End of 1st 7½ Yrs.	205,000	171,000
Value	$217,000	$180,000
Original Drilling Cost	$ 38,300	$ 33,800
Cost of Pulling & Cleanout Jobs	$ 1,000*	$ 3,000
Cost of Redrilling Jobs	....	$ 5,000**
Net Return before paying Taxes, Overhead & Ordinary Lifting Exp.	$177,700	$138,200

*Includes cost of experimental washing and gun perforating two wells to increase productivity.

**Prorated cost of redrilling 3 wells to 9 wells.

From the above figures there can be no doubt as to the economic advantages indicated by a comparison of the performance during first 7½ years of the life of the group of conventional wells with that of the prepacked and gravel packed wells.

Gun Perforating and Chemical Treatment Aids Declining Wells

However, there still remains the problem of producing the zone to depletion through the gravel packed and prepacked liners. A number of wells have already declined to rates of 5 barrels a day or less in spite of the known ability of the formation at the particular location to produce at many times this rate. This has been demonstrated by greatly increased productivity after gun perforating.

No uniformly successful method of correcting this condition has yet been developed. However, some wells have been improved, at least for several months, by washing with hot oil. Recent use of chemicals in washing plugged liners has yielded good early results in a sufficient number of cases to foster the hope that a solution of the problem may be found in this direction. Experimental gun perforating has increased the productivity of some of the wells in which it has been tried but it has also been the cause, in some cases, of loss of ability to control sand production without greatly restricting the rate of production.

Different Muds Used In Drilling and Completing

The fluid used in drilling through the producing zone and the steps taken to clean the hole and the perforations in the liner have an important bearing on the performance of the wells. However, all of the wells used in the economic analysis were drilled with ordinary clay base mud, the only difference in completion being that most of the gravel packed and prepacked wells were washed by circulating fresh water out through the liner before being placed on production.

Recent Tar, Ranger, and Upper Terminal zone wells have been drilled through the producing zone with oil base or emulsion drilling fluid or with specially treated low water loss muds. Most of the wells are thoroughly washed, many operators making a regular practice of using wall scratchers, moving the liners and circulating oil or salt water during the washing process. No attempt is made to evaluate the results of these practices since the principal purpose is to investigate the effectiveness of various types of liners in preventing sand trouble. It should be remembered, however, that having all possible perforations open and providing that all portions of the zone are in condition to contribute production are important factors in reducing velocity and preventing excessive sand production when liners are used which are not designed to screen all sand.

Sand Control By Controlling Fluid Flow

The method of controlling sand which consists of controlling the fluid flow into the well has not been successfully applied to any large number of wells. Even pumping with tubing high or with back pressure regulators on the casing has not prevented sand trouble. Restriction of production rates was necessary in nearly all the early wells to prevent immediate sanding up but liner failure and redrilling have been common even among the wells with conventional liners which were most severely restricted. From the performance record, it is concluded that successful application of this method at Wilmington would involve restricting wells to much lower rates than has yet been attempted. Under the competitive conditions which exist at Wilmington, this would undoubtedly result in drainage losses of such magnitude as to make the system impractical.

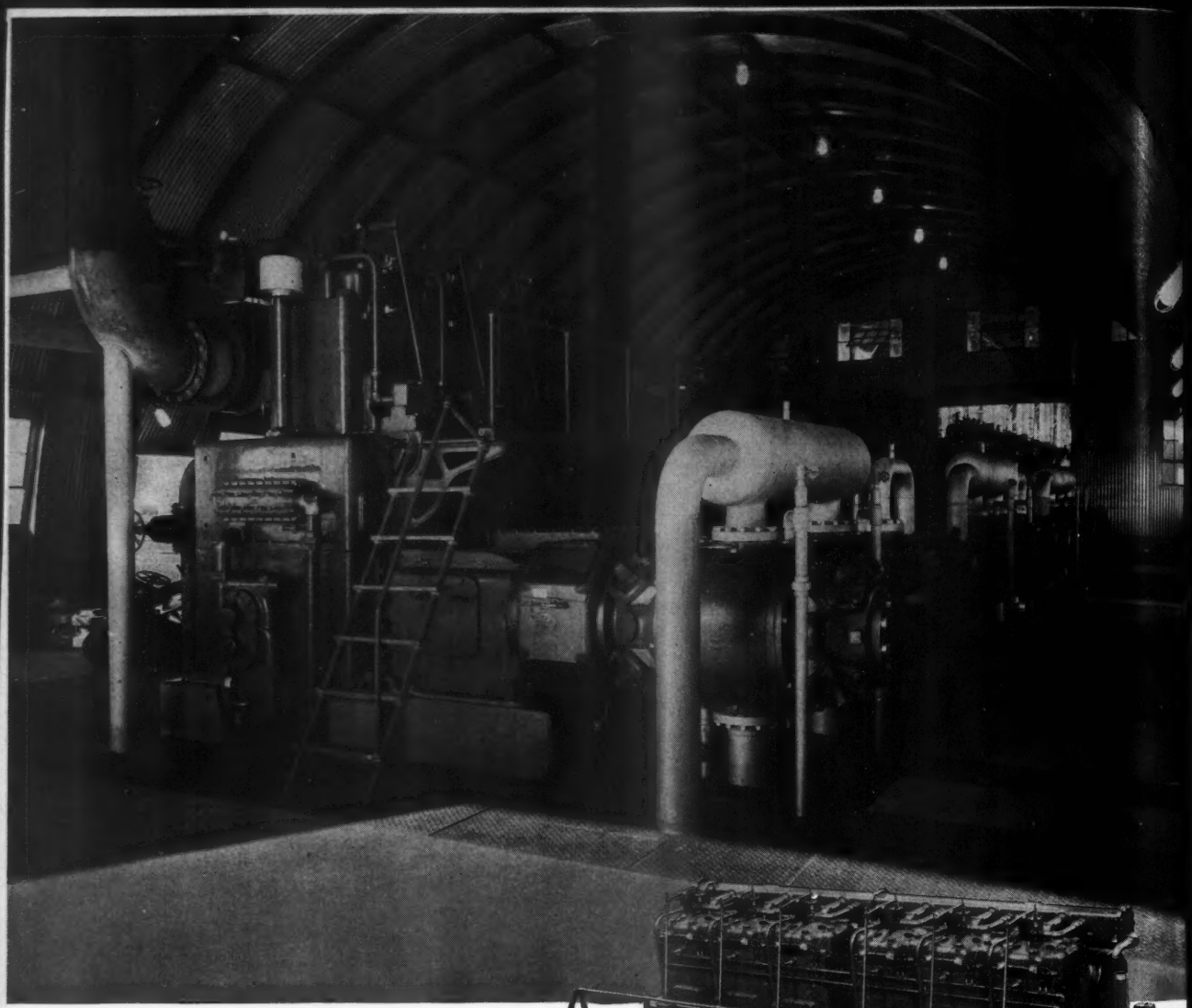
Conclusions

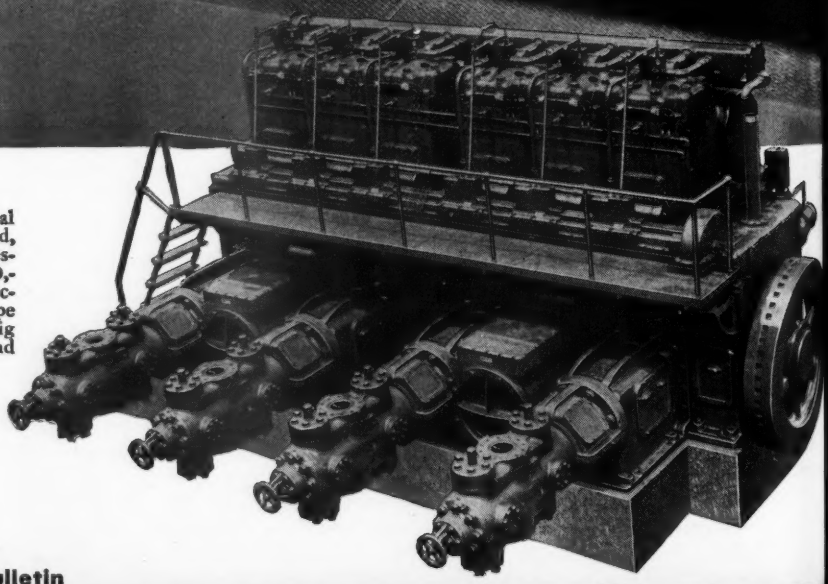
The study of performance and the economic analysis outlined herein have led to the following conclusions with regard to type of liners to be used in wells drilled to the Tar, Ranger, and upper Terminal zones in the Wilmington Field:

(1) Sand can be successfully controlled through the use of 0.131" - 0.187" or smaller gravel in gravel packs and 0.093" - 0.131" or smaller gravel in prepacks. (Early performance of prepacks using 0.093" - 0.250" gravel indicates results similar to those obtained with 0.093" - 0.131".)

(2) Use of larger gravel as well as slots of .030" width, round holes

(Continued on Page 33)





(*Above*) In Peppers Refining Co. natural gasoline extraction plant at West Edmond, Oklahoma, these three Clark BA Compressor Units, 1,000 BHP each, handle 23,500,000 cu. ft. of gas per day from 60 lbs. suction to 500 lbs. discharge into a gas pipe line. (*Right*) View of 6-cyl., 1,200 BHP "Big Angle" unit, massive but compact and accessible.

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Fluidynamics and Thermodynamics of Hydrocarbon Separation Processes

Continued from 2nd May Issue

By Wayne C. Edmister
Hydrocarbon Research, Inc.
115 Broadway, New York

COLUMN CAPACITY

In carrying out the multi-stage vapor and liquid contacting necessary in the separation of hydrocarbons by absorption or fractionation, the liquid and vapor streams flow in opposite direction from stage to stage in the column. The vapor flows up the column due to a higher pressure at the bottom and the liquid flows down the column due to a liquid gravity head. The capacity of any contacting apparatus is a function of both liquid and vapor flow rates, the capacity of one decreasing as the rate of the other increases. Likewise the plate spacing or the distances between the stages determines the capacity of a column, because it is this distance that creates the gravity head of liquid and permits the liquid to flow down the column against the higher static pressure. The principle reason why bubble plate columns are used in preference to packed columns for hydrocarbon separation operations is the higher capacities of bubble plates to handle vapor and liquid. Although a packed column has counter current flow between the vapor and liquid phases, packing has size and service limitations. In large sizes, the distribution of liquid and vapor constitutes a serious problem, making the packed tower impractical for most commercial hydrocarbon separation services. This distribution problem is aggravated by the fact that the allowable superficial vapor velocity for packed columns is about half that for bubble plate towers. Thus a packed tower of five feet in diameter would be required to handle the same load that a 3.5 feet bubble tower would handle. Of course, the bubble tower would have to be much higher, which to a certain extent compensates for the difference in diameter, but not entirely. Uneven distribution makes the packed tower impractical except for laboratory units and special services. In addition to distribution troubles, fouling and ease of cleaning differences are in favor of bubble plate columns.

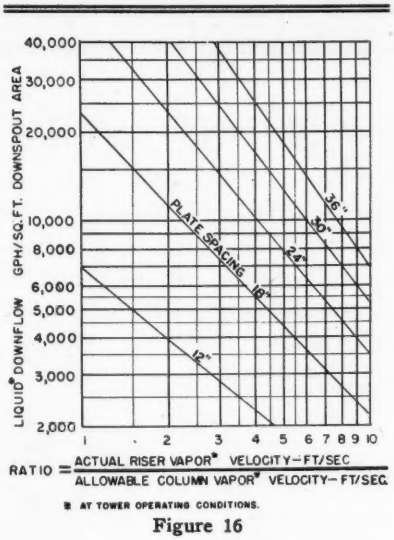

Figure 16

For the above reason the column capacity discussion will pertain to bubble plate columns. As mentioned above the vapor and liquid capacities are related through the various pressure drops. This is a special fluidynamic problem. Computing the various pressure drops is tedious and often uncertain because of the numerous assumptions necessary. For these reasons, empirical capacity correlations are frequently developed from data on plant towers known to be near or at flooding conditions. When a bubble tower has reached its maximum capacity, it floods and the counterflow of liquid and vapor stops and the plates fill up, thus interrupting the operation.

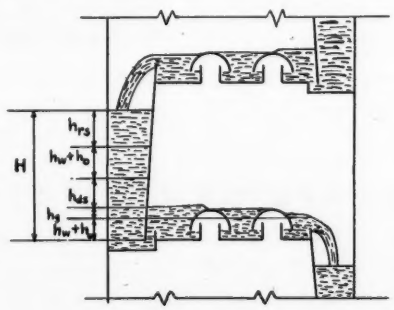

Figure 17

Figure 16 represents the relationship that exists between the liquid down flow rate and the vapor rate for different plate spacing for commercial petroleum bubble towers. The liquid down flow rate is plotted as gallons per hour at the tower operating conditions per square foot of down spout area versus the ratio of the actual vapor velocity through the vapor rising to the allowable column superficial vapor velocity. This plot is intended to illustrate the trends and should be considered for reference only and not to be used in design.

Actually the column capacity is not as simple a function as is indicated on Figure 16, because the details of the plate determine the pressure drop which determines the capacity. This is illustrated on Figure 17, which indicates the different pressure drops which must be counterbalanced by a depth of liquid in the down spout. Referring to Figure 17 the various pressure drops are defined and calculated as follows:

- h_w —weir depth, which is given or assumed.
- h_o —head over weir, which is computed by weir formula using effective weir length and discharge coefficients.
- h_{rc} —the head lost by the vapor in contracting and expanding through the risers and caps, which is computed as 1½ vapor velocity heads.
- h_{ds} —The head lost through the down spout and seal pot. This is calculated as 1½ liquid velocity heads.
- h_g —the head lost due to the liquid gradient across the plate and may be calculated by estimating the clear area of flow the wetted perimeter, etc.

Looking Around

By THE OBSERVER

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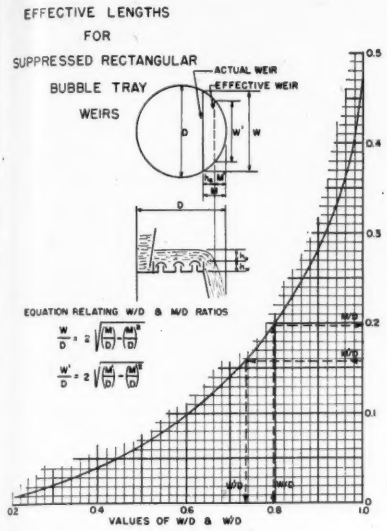

Figure 18

The summation of these different pressure drops when corrected for the difference in the liquid and vapor densities will give the distance which the liquid will back up in the down spout. It is obvious from reference to Figure 17 that a column will flood when the liquid backs up too far in the down spout.

One of the unknowns in making this type of calculation is the foam. The liquid is never as quiescent as foam because in going through the caps the vapor makes foam and this foam does not completely break apart until the liquid is in the down spout. Actually it is necessary to allow for some vapor releasing in the top of the down spout. The vapor that is dissolved in the liquid will decrease the density of the liquid to the point where the liquid depth is more than would be calculated by means of pressure drops alone. In computing the head of the weir it is a customary practice to use weir formulae with a constant discharge coefficient and also using the full length of the weirs. However, neither of these simplications are correct because the weir is restricted by the curved sides of the tower and also because the approach velocity of the liquid on the weir is not negligible.

The effective weir length will be less than the actual length depending upon the amount of the restriction which will depend upon the column diameter, the length of the weir and the head over the weir. These factors are illustrated on Figure 18, where the different dimensions are indicated on the sketch. Applying simple geometry to this figure and using these dimensions permit deriving equations relating important ratios. From this it is possible to compute the effective weir length as a function of these columns. This computation, by the means of the graphical representation of this relationship given on Figure 18, should be clear from the example shown.

On Figure 19, the weir discharge coefficient is shown as a function of the weir height and the head over the weir. The use of this graph involves successive approximations as

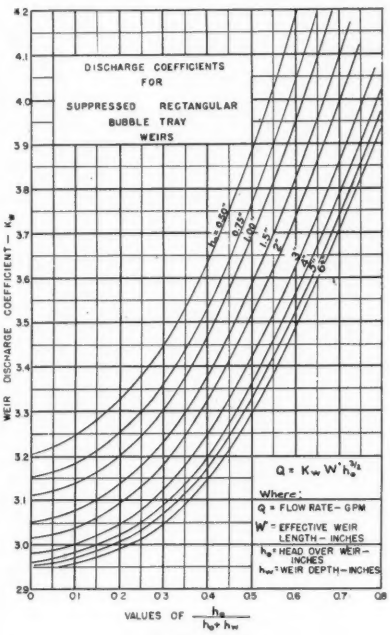

Figure 19

the weir head is involved in determining the discharge coefficiencies. The weir discharge coefficients shown on this chart allow for the approach velocity, which varies with weir depth and weir head. Figure 19 is an approximate chart drawn by applying imagination and theory to published data on the effect of the approach velocity on the discharge coefficient for suppressed rectangular weirs. The orifice discharge coefficient curve was used to help determine the shape of these curves. From this chart it can be seen that the weir discharge coefficient varies appreciably.

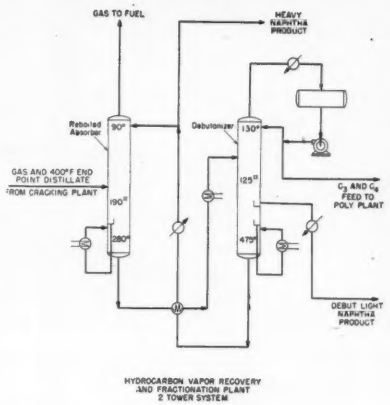
GAS TO FUEL
HEAVY NAPHTHA PRODUCT
Reboiled Absorber
Debutanizer
GAS AND 400°F END POINT DISTILLATE FROM CRACKING PLANT
C3 AND C4 FEED TO POLY PLANT
DEBUT LIGHT NAPHTHA PRODUCT
HYDROCARBON VAPOR RECOVERY AND FRACTIONATION PLANT 2 TOWER SYSTEM

Figure 20

Figures 17, 18, and 19 are presented to point out some of the considerations involved in analyzing a column from the standpoint of capacity. This subject requires a great deal of study and it is hoped that consistent efforts will be applied. The Fluidynamics of a bubble plate column is very complex, involving mixed phase flows, etc. It would appear that the capacity of a column to handle liquid and vapor is a subject that can be developed best empirically, using theoretical concepts to interpret and correlate the results.

EQUIPMENT AND APARATUS

As mentioned earlier in this discussion, bubble plate columns are used because they are the most practical for the high capacity services encountered in the hydrocarbon industry. The important features in the design of a bubble tower are the bubble plates, the reboiling hookup and the refluxing arrangement. The bubble plates may be built in different ways to provide the desired flow patterns or bubbling surface. As illustrated on Figure 13, the flow pattern may be cross liquid flow in opposite direction on alternate plates or in the same direction on all plates by a special down flow pipe, all with or without mixing of the vapor. Where the diameter of the tower is great or the liquid flow high, two pass or cascade single pass trays are used to avoid having a high liquid gradient. These all have different fluidynamic characteristics, which should be considered in analyzing performance data.

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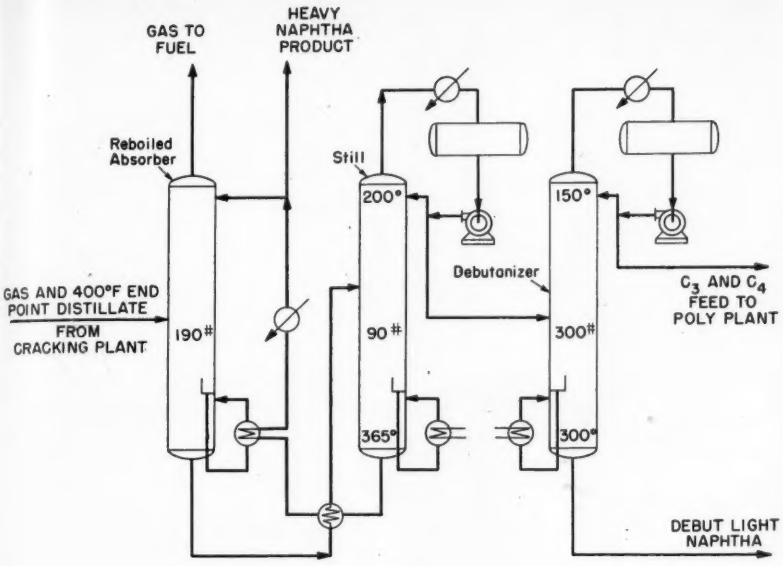


HYDROCARBON VAPOR RECOVERY AND FRACTIONATION PLANT 3 TOWER SYSTEM

Figure 21

Reflux may be provided by partial or total condensers with pumpback or by top tray recirculating reflux. Reboiling may be done by thermal siphon reboilers, kettle reboilers, etc., depending upon the conditions and heat source. With reference to the reflux and reboiling, it is sufficient for these purposes to recognize the different possibilities. The same theory and equation applies to all. It is necessary to allow sufficient time and surface in designing reboilers and condensers to get the desired heat transfer and holding times.

In many cases heat may be rerecovered and used elsewhere in the system. Where there are two towers in series fractionating a narrow mixture it is sometimes possible to use the heat from the reflux condenser of the first tower to reboil the second. The pressures and temperatures must be properly balanced to accomplish this, however.

A more common heat recovery means is to preheat the feed by heat exchange with the hot product streams. Another is to expand and vaporize cold light hydrocarbon liquids for the refrigeration duty obtainable. In separating light hydrocarbons in the ethane and propane boiling range, it is necessary to employ high pressures and/or refrigeration. Without refrigeration the pressures are so high that it is impossible to condense reflux because of the proximity of the critical point.

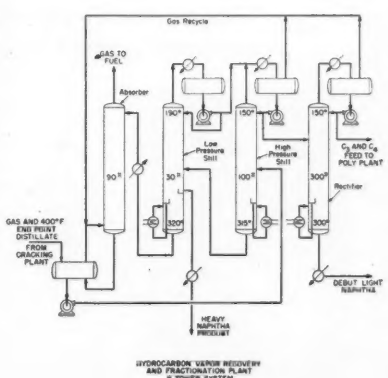
As examples of the types of hydrocarbon separation processes in commercial use, flow diagrams of three schemes to carry out the same job are presented as Figures 20, 21, and 22, which are two, three and four tower vapor recovery and stabilization units for handling the gas and gasoline products from a catalytic cracking unit. The charge stock to each scheme is the same and the products are essentially the same, the differences being in light hydrocarbon losses and sharpness of separation. The products are: (a) fuel gas, (b) C_3-C_4 poly plant feed, (c) debut light naphtha and (d) heavy naphtha. In all cases the lean oil is a recirculated portion of the charge. The advantages and disadvantages of each scheme should be apparent from the flow diagrams. In general, it can be stated that more towers increase the cost of the equipment and also the efficiencies of recovery and separation and of energy utilization.

The two tower system, shown on Figure 20, is the simplest but it requires a high level heat to reboil the debutanizer and the absorber operates at a high pressure and the lean oil loss in the fuel gas is higher than in a system employing a separate stripping still.

Adding a still to give the three tower system, shown on Figure 21, gets around two of the disadvantages of the two tower system; namely, the temperature in the debutanizer is not as high and the lean oil is better stripped. However, the absorber pressure is high, thus requiring relatively high gas compression power. Adding a second still to make a four tower system, as shown in Figure 22, permits lowering the absorber pressure. Advantages of the four tower system are: (a) lower absorber pressure, (b) more thoroughly denuded lean oil and less lean oil and condensible losses, (c) lower temperatures and lower grade heat for reboiling.

The type of process determines the level and the source of reboiling heat, which influences the design of the reboiler. Steam, hot oil or direct fire heat reboilers are used.

Figures 20, 21 and 22 represent absorption vapor recovery systems. Another type of vapor recovery system employed in the natural gasoline industry is vapor rectification, where the vapors are compressed and charged direct to a rectifier. This type of plant is described in the literature (73, 74). Another type of vapor recovery system used in small refinery installation is the use of a gas oil side stream from the cracking unit, for example, as the lean oil and returning the rich



HYDROCARBON VAPOR RECOVERY AND FRACTIONATION PLANT 4 TOWER SYSTEM

Figure 22

SIMPLIFIED DESIGN FOR ACCURATE LOW-COST OPERATION

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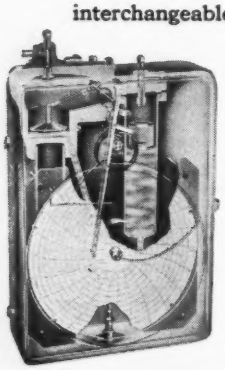

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oil back to the cracking unit bubble tower. This scheme involves additional recycle of light components. When considering different systems, such as those described, for a given hydrocarbon separation job, it is necessary to make comparative calculations to evaluate the relative merits from a recovery efficiency standpoint and also from a thermodynamic efficiency standpoint. The procedures discussed in this paper should be of value in this respect.

CONCLUSION

The discussion, charts and literature references constituting this article have covered the subject of hydrocarbon separation processes with emphasis on absorption-stripping and fractional distillation as carried out in bubble plate towers by the petroleum and natural gasoline industries. These processes, which are well known operations with very few if any secrets, constitute the backbone of the hydrocarbon industries and for this reason should be reduced to an exact science for purposes of more accurate design and more efficient operations.

The interrelationship that exists between the fundamental data and the design method has not been given proper allowances in the past. Standardization of phase equilibrium constants, enthalpy data, and theoretical calculation method would help toward obtaining consistent plate efficiency factors, since these are obtained by analyzing plant performance data.

These objectives can be accomplished only by a combined application of theoretical and experimental methods, using the laws and concepts of fluid flow, heat transfer, and thermodynamics and also commercial plant performance data as well as laboratory data.

The development work in this field should be coordinated by technical society and/or university committees in order to make the results all consistent. Such a program might be undertaken by an organization such as C.N.G.A.

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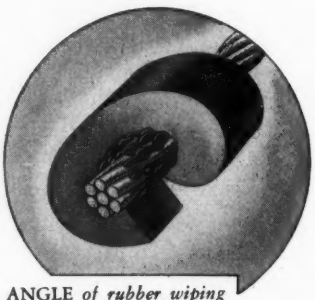
(Continued on Page 36)

To Squee-gee Oil off a Corkscrew

Or...why Patterson-Ballagh's spiral wiping principle wipes wire lines clean and dry

Wire lines are like a corkscrew. Their surface is a complex pattern of twisty grooves and channels where oil, mud or salt water collects and flows into droplets. When carried aloft on the line, the droplets blow off or shake free to shower down on the crew and rig, resulting in fire and accident risk from oil or in salt water corrosion plus a loss of many dollars in clean up costs in any case.



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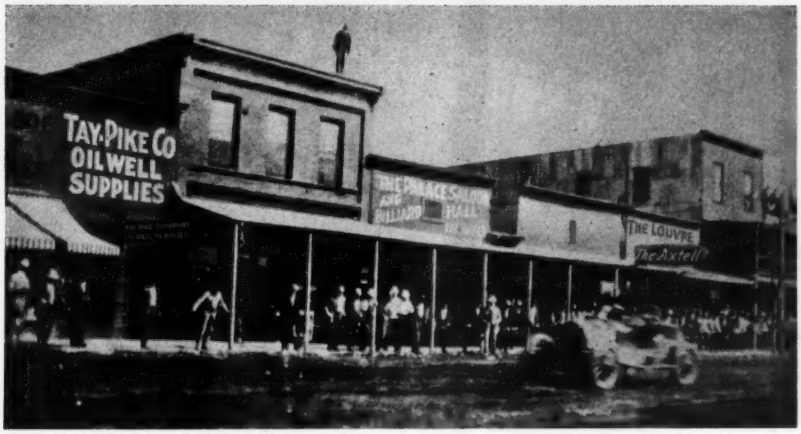
Republic Supply Celebrates 30th Anniversary

The facts brought out in an interview with The Republic Supply Company of California on the occasion of its recent 30th birthday makes it difficult to write a story without references to Horatio Alger and other exponents of the old "onward and upward" school of fiction . . . which references would quite rightly be resented by the company.

But the facts in themselves are amazing, and would furnish a field day to the statistically-minded boys who love to make charts comparing "then and now". It is probable that no one has prepared figures comparing, let's say, the floor area of the first small Coalinga store and the combined floor areas of the fourteen stores, warehouses, manufacturing plant and offices which Republic Supply occupies today, but those figures would be startling. Further to intrigue the imagination, there is the seeming paradox that the company is still under the direction of the original founders of thirty years ago, yet the management is composed, almost entirely, of men in their early thirties and forties: P. M. Pike, founder of Republic, is chairman of the Board of Directors of the Company; Dale Russell, vice president, who managed the first Coalinga store, is a member of Republic's Board of Directors; while J. J. Pike, son of the founder, is President of the Company in active charge.

The Republic Supply Company of California had its genesis in the old Tay-Pike Company, which started in 1910, in Coalinga. In March of 1917, P. M. Pike, who helped found the Tay-Pike Company, formed the Republic Well Supply Company of California, buying Tay-Pike's Coalinga and Taft stores.

Subsequently, the name of the Company was changed to the one it now carries — The Republic Supply Company of California. The main office and store were set up in San Francisco, and remained there till 1921, when Los Angeles became the company's headquarters. 1921 also saw the establishment of stores to serve the booming oil fields in Los Angeles, Long Beach, Huntington Beach and Santa Fe Springs, the first oil field supply stores in these areas.



First Republic Supply Store, Coalinga, 1912.

As new discoveries were made and new fields developed, Republic followed the development either with new stores or by buying other companies; for instance, the old Associated Supply Company, purchased in its entirety by Republic. Today, Republic, boasts supply stores or manufacturing facilities in Los Angeles, Oakland (Emeryville), Avenal, Burrell, Bakersfield, Fresno, Huntington Beach, Long Beach, Newhall Ranch, Santa Maria, Santa Fe Springs, Taft, Ventura and Wilmington. As Republic has extended its scope and service facilities, it has, of recent years, taken on more and more industrial supplies, in addition to its oil field services. Republic feels that the strategic location of its stores gives it practically full state coverage, from the standpoint of quick and efficient service to industry.

In nearly all cases, Republic owns the properties it occupies, which properties are being expanded and improved as rapidly as conditions allow. The store in Bakersfield for instance, finished in 1937, is regarded as an outstanding example of good modern industrial architecture. A new store has just been built in Fresno, and the finishing touches are being applied to a new structure just completed and now occupied in Wilmington. In addition, it is planned to give the large Los Angeles main office a new and larger home in the course of the next two years, or even earlier if the difficulties of building in these days can be somewhat eased. The manufacturing division, under the guidance of A. G. Fraser, who has been with Republic for twenty years, is outgrowing its present good-sized quarters.

Main Office—Los Angeles

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Los Angeles Basin

Long Beach Test Coring

Shell Oil Co.'s Dolley No. 2, a deep test in Sec. 29-4s-12w on the northeast flank of the old Signal Hill field, is coring ahead at 10,164 ft. The project on test apparently swabbed some oil, but failed to flow from the interval open between 10,030-10,119 ft. The 7-in. casing is cemented at 10,030 ft.

More than ordinary interest is being displayed in the Shell deep explorer. Leasing on the north flank of the field has been brisk, with ground being taken as far away as the Virginia Country Club.

West Newport Adding Interest

Hiawatha Exploration Co. is preparing to drill Atha No. 5 an offset to Dunlap No. 7 in the West Newport field. The well will drill on ground owned by George Atha, geologist and producer, who originated development in this sector.

D. D. and Dorothy Dunlap, meantime, have completed Aldrich Land Co. No. 6 in Sec. 18-6s-10w at 3110 ft. for 740 barrels of 21.2 gravity oil daily, cutting very slightly through a 35/64-in. choke. No. 7 well is drilling ahead at 2050 ft.

California Exploration Co.'s Cagney No. 1, which went to 1645 ft. in gray sand, has plugged back to 960 ft. and is setting whipstock to redrill directionally to the northwest. The A, B, and C zones were all barren and gray. Location falls in Sec. 28-6s-10w. Amerada Petroleum Corp.'s Farnsworth No. 46-7 in Sec. 7 is making hole ahead at 4587 ft.

Santa Ana Try Drills

In the Santa Ana Canyon area of Orange County, Rubicon Oil Co. is exploring ahead at 4657 feet in Red Beds in Wilcox No. 1 in Sec. 6-4n-8w.

Palmdale Try Going On Down

Near Palmdale in Antelope Valley, Willette Oil Co. is drilling granite at 3603 ft. in Virginia Lee No. 1 in Sec. 20-5n-9w, Los Angeles County. Amapola Oil Corp.'s No. 1 in Sec. 6-6n-12w in the Lancaster area still stands idle at 1750 ft.

Inglewood Well Going

Basin Oil Co.'s City of Inglewood No. 1 in Sec. 28-2s-14w in the Inglewood area is drilling at 8888 ft. The project has entered the interesting phase, with appearance of the upper zones anticipated in the next few hundred ft.

Newhall-Potrero Deep Test Drills

Spudded on May 6, General Exploration Co.'s Ferguson No. 3 deep test in Sec. 36-4n-17w in the Newhall-Potrero area at last reports had taken in 4391 ft. of hole. Travelling will be carried several thousand ft. more for contact with prime objective. General Exploration divides interest in the deep explorer with Union Oil Co.

Del Valle Try Digging

R. E. Havenstrite Operator, Lincoln No. 15 in Sec. 16-4n-17w is making hole ahead at 11,505 ft. The venture, which is chalking up 25 or 30 ft. of hole daily, found a new deep zone at 10,140 ft. This sand will later undergo trials. Barnes No. 9 in the section is a rig only. Standard of California's Boobier No. 1 test in Sec. 15 is spot coring below 7600 feet. Location is north of faulting and if successful production is scored by the current job, it will mark the first well on this side of structural displacement.

Seal Beach Test Resumes

Marine Exploration Co. has set boilers and is ready to deepen its State No. 1 in Sec. 11-5s-12w in the Seal Beach area. The company, a combination of Texas Co. and Jergins Oil Co., whipped the well offshore from the south boundary of Seal Beach some years ago. It went at that time to 8050 ft.

Alondra Well Drills On Down

In the Alondra area, British-American Oil Prod. Co. is drilling at 8097 ft. with Park Comm. No. 1 in Sec. 22-3s-14w, Los Angeles County. H. C. Christie, Johnson No. 1 in the section is eating away at 2832 ft.

Leffingwell Try Drilling

Standard of California's German Comm. No. 1 test in Sec. 11-3s-11w in the Leffingwell area, Los Angeles County, is drilling at 9924 ft. Electric log was run to 9900 ft. Highland Oil Co.'s Esterbrook No. 1 in Sec. 1-3s-11w is a rig only.

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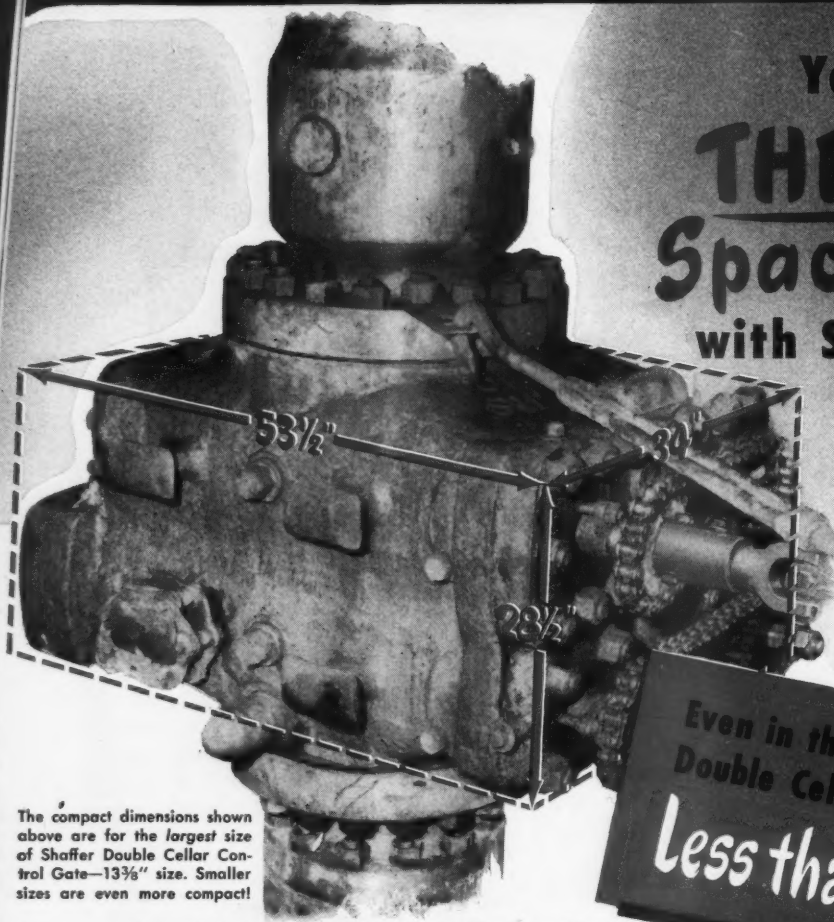

The compact dimensions shown above are for the *largest* size of Shaffer Double Cellar Control Gate—13⅜" size. Smaller sizes are even more compact!

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ALTHOUGH SHAFFER Cellar Control Gates have long been noted for their unusually small overall *height*, also keep in mind that Shaffer Gates are amazingly compact in *length* and *width*, too. This means that Shaffer Gates not only minimize costly cellar depth requirements and permit lower rig floors, but in addition, they assure more *all-around* space in the cellar and make possible a cleaner, more compact rig hook-up.

For example, check the three-way compactness of the 13⅜" Shaffer Double Cellar Control Gate which is the largest size built. Although it combines TWO complete ram compartments in *one* body—with rams in the upper compartment for closing off around pipe and rams in the lower compartment for closing off open hole—this Shaffer Double Cellar Control Gate measures only 28½" high, 34" wide and 53½" long—a cellar-saving compactness unequalled by any other gate of equal bore. *And Shaffer Double Gates of smaller sizes are even more compact!*

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Athens Test Makes Progress

Shell Oil Co., Union-Poindexter No. 1 in Sec. 12-3s-14w in the Athens area is drilling in sand and shale at 7846 ft. In the proved area, Union Oil Co. has staked Pierce Comm. No. 1 and Rose No. 48 near the intersection of Figueroa and Rosecrans Ave.

Lawndale Try About To Spud

Seaboard Oil Co. is preparing to spud Johnson No. 1 in Sec. 17-3s-14w in the Lawndale area. The well is designed to seek deep and hitherto untapped zones.

Whittier Well Fishes

Fishing drill pipe has the attention of O'Melia Oil Co. with its Pellissier No. 9 in Sec. 17-2s-11w in the Whittier Heights area. Total depth is 4240 ft.

Riverside County Explorer Drilling

Not far from Temecula in Riverside County, Palomar Petroleum Co. continues to drill steadily ahead at 2710 ft. with Tyrell No. 1 in Sec. 13-8s-1w.

Riverside County yet is to develop commercial production, although some areas have been looked upon as fair prospect ground by a number of geologists.

Los Angeles Try Deeper

Edison No. 2 in Sec. 16-2s-12w, Richfield Oil Corp.'s current undertaking in the East Los Angeles area, is drilling at 8230 ft.

Beach City Lively Area

Calumet Gold Mines Co.'s No. 4 in Sec. 10-6s-11w at Huntington Beach has casing standing cemented at 1791 ft. Total depth is 2126 ft., with plug at 1840 ft. No. 1 is currently pumping 32 barrels a day. No. 2 is making 45 barrels and No. 23, 27 barrels. Morton & Kohlbush Town Lot No. 1 is reaming. Electric log was run to bottom at 3600 ft. W. E. Medearis is understood planning to drill two Tar zone wells on the Bundy lease close to 13th and Orange Sts.

Santa Fe Springs Starting Two Jobs

Standard of California has staked locations for Koontz No. 13 near Norwalk Blvd. and Florence Ave. in Sec. 6-3s-11w, and Woodhead No. 1 in Sec. 7.

Puente Wildcat Getting Ready

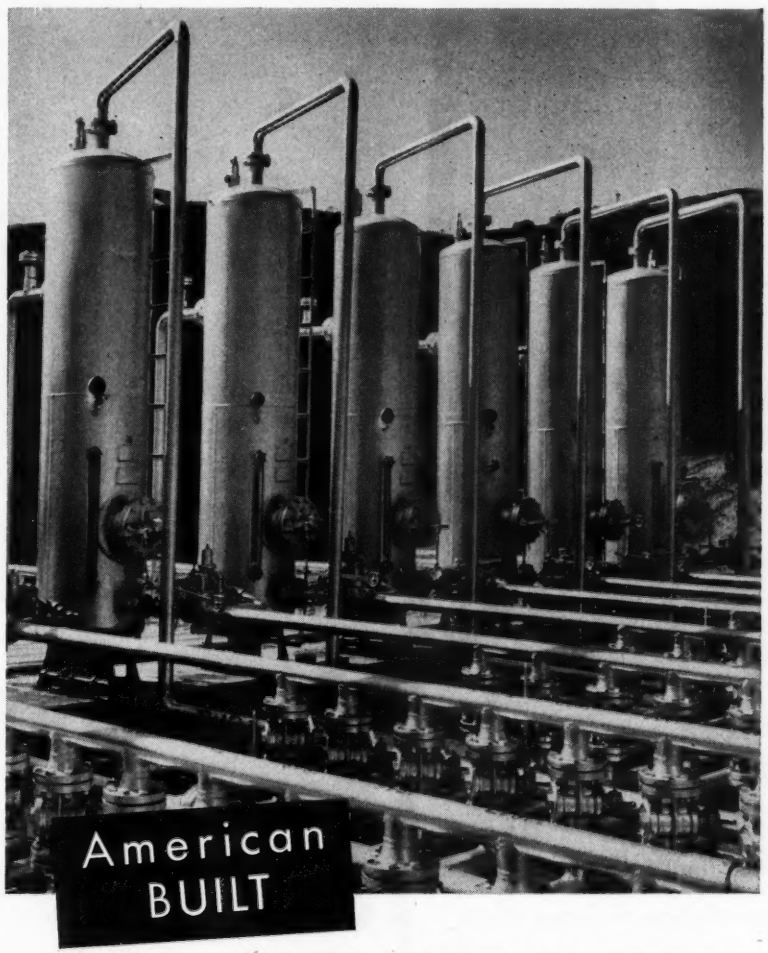
Triple S. Petroleum Corp. is preparing to drill a wildcat test in Sec. 18-2s-9w in the Puente area. The company is a Hollywood concern headed by Fred W. Shire.

Harbor Wells Will Redrill

Dumm Bros. Petroleum Corp., Long Beach, is preparing to redrill two wells on the Hogan lease in the Harbor area.

Ramona Well New Completion

In the Ramona field, Bankline Oil Co. has finished at 4450 ft. its Black No. 104 in Sec. 13-4n-18w. Initial output was 136 barrels of 23.4 gravity crude oil a day.



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San Joaquin Valley

Sheep Springs Discovery Looms

Drill pipe fish, top of which is at 2320 ft. is being worked over in Rothschild-Bender Oil Operations No. 8 in Sec. 17-29s-21e in the Sheep Springs area.

The project staged a sensational blowout the other day when coming out of the hole. It was finally killed by heavy mud. Before control was established, however, the intensity of pressure forced gas to the surface outside casing and through fissures extending some distance from the well site.

Located about a mile and one-half northwest of Cymric production, the well topped Oceanic oil sand at 4820 ft. in going to a total depth of 4885 ft. Consequently, a new Oceanic pool discovery appears in the offing.

The project was originally fitted with 200 ft. of 11¾-in surface pipe. An additional 850 ft. of 9⅝-in. surface casing has been run as a safety measure before removing all of fish.

A discovery at this location would also benefit Texas Co., Superior Oil Co. and Independent Exploration Co. The latter holds leases totaling 700 acres in the area.

Cantua Creek Wildcat Starts

Cantua Creek Oil Co., sponsored by a group of Fresno businessmen, has staked location for a wildcat test in Sec. 3-17s-15e in the Cantua Creek area, Fresno County.

Sharktooth Try Rigging Derrick

Barnsdall Oil Co. is rigging derrick to start the drill in S. P. No. 1 in Sec. 25-28s-28e in the Sharktooth area, Kern County. Oil was first discovered in the area during 1944 by Bender-Bergen Oil Co.

Cymric Well Redrills Ahead

On its 160-acre Sauerdough lease in the Cymric field Universal Consolidated Oil Co. is redrilling No. 13 in Sec. 23-29s-21e below 4400 ft.

The company's average daily production during the past year has increased approximately 100 per cent. This is due largely to the dozen producing wells on the Sauerdough property. Spread throughout San Joaquin Valley and the Los Angeles Basin are approximately 13,500 acres held by Universal Consolidated either in fee or by leaseholds. The properties involved are all strategically located in relation to exploratory activities or routine development.

In the Lost Hills area, the company has finished No. 18 in Sec. 30-26s-21e. It went to a total depth of 1957 ft. for an initial yield of 28 barrels on the pump in 15 hours.

Tejon Well Completing

C. C. M. O. Co.'s No. 16-32 in Sec. 32-11n-19w in the Grapevine-Tejon area is nearing the completion stage, with bottom at 2624 ft. in oil sand and casing cemented at 2553 ft.

An interesting aspect of the well is the 30 ft. of oil sand cored in the Upper Chanac zone. This zone, topped at 1976 ft., apparently has not been cored by previous wells in the area.

Wheeler Ridge Prospect Drills

Richfield Oil Corp. is drilling at 1311 ft. with Wheeler Ridge-KCL No. C-1 in Sec. 20-11n-20w in the Wheeler Ridge area of Kern County. The company's Berry No. 1 in Sec. 30-28s-21e at South Belridge has been abandoned at 10,034 ft. Belridge No. B-2 in Sec. 21-27s-20e in the North Belridge area is standing with casing cemented at 8575 ft. Total depth is 8820 ft., probably in the Temblor sand.

Pyramid Hills Test Shows Oil

Having plugged back to 1300 ft. from a total depth of 1885 ft., Cal Valley Oil Co. is ready to run casing in well No. 13 in Sec. 17-24s-18e in the Pyramid Hills of Kings County. Oil showings in the interval of 1050-1250 ft. will be tested. Guaranty Sales, Inc., Corehole No. 3 in Sec. 8 is idle at 2875 ft.

Miramonte Test Ready to Redrill

In the Miramonte area not far from the Buttonwillow field, Pacific Western Oil Corp. is preparing to redrill from 9504 ft. its National Royalties No. 1 in Sec. 5-26s-22e, which originally was the world's depth champ when it went to 16,668 ft. This drilling depth record has since been supplanted by a well being drilled by Superior Oil of California in Caddo County, Okla.

San Emigdio Project Idle

Still standing idle is Continental Oil Co.'s KCL No. L-1 in Sec. 11-11n-22w in the San Emigdio area, Kern County. Total depth is 10,424 ft.

Arvin Try Swabbing

On open hole test, Louis H. Didier's Didier No. 1 in Sec. 10-31s-30e in the Arvin area swabbed water with a trace of oil. Bottom is 905 ft. in granite, with casing set at 645 ft.

McKittrick Well Finished

Texas Co. has completed at 6548 ft. its Tulare NCT One No. 28-28 in Sec. 28-30s-22e in the McKittrick area for an initial output of 51 barrels of 43.3 gravity oil and 496,000 cubic ft. of gas daily through a 6/64-in. bean. Westpet NCT One No. 57-29 in Sec. 29 is rigging up. Victor Exploration Co.'s No. 1 in Sec. 32-29s-22e is a rig. Wilshire Oil Co.'s McKittrick No. 3 in Sec. 12-30s-21e is a location.

Pond Wildcat Rigging Up

Approximately four miles from the southeast edge of the Trico gas field, Western Gulf Oil Co. is rigging Crown Zellerbach No. 1 in Sec. 27-25s-24e in the Pond area. Di Giorgio No. 2 in Sec. 10-31s-29e in the Arvin area also is rigging up. S. P. No. 1 in Sec. 25-12n-20w in the Sand Hills area is drilling at 11,555 ft.

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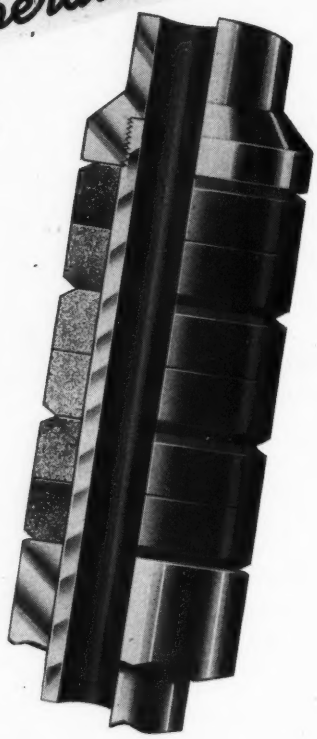

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Edison Test Drilling On

Northeast of the Edison field, Caliente Oil Co. is drilling at 2341 ft. with Cohn Estate No. 1 in Sec. 12-30s-29e. Fred E. Stewart's Thomas No. 1 in Sec. 27-30s-30e continues idle at 605 ft.

Bena Wildcat In Prospect

Gene Reid Exploration Co. is making ready to start work on a wildcat test known as Marley No. 1 in the Bena area in Sec. 14-30s-30e, Kern County.

Devils Den Well Listed

S. R. DeKalb, long identified with Devils Den oil development, has location staked for another drilling job in Sec. 25-25s-18e. It will be known as Blake No. 16.

Ten Section Test Redrills

Shell Oil Co., KCL-A No. 53-30 in Sec. 30-30s-26e in the Ten Section field is redrilling at 10,990 ft. A designated deep test, the hole was originally carried to 13,745 ft.

The Guth McCaleb Comm No. 1 wildcat in Sec. 12-26s-26e in the McFarland area is sidewall sampling after running electric log. Total depth is 5280 ft., with top gray Vedder at 4223 ft.

Kettleman Hills Venture Redrills

Standard of California's No. 73-30V, which made an Eocene discovery by going to a total depth of 12,389 ft. is redrilling at 7649 ft. The original hole was mechanically imperfect due to drill pipe lost in bottom portion of the well.

Bacon Hills Project Digs

Seaboard Oil Co.'s Seaboard-Bandini No. 24-21 in Sec. 21-28s-20e in the Bacon Hills area is drilling at 2348 ft. This is a followup to the discovery well. Near Panoche Creek, Seaboard is preparing to spud Lillis No. 85-26 in Sec. 36-15s-12e.

Edison Wildcat Runs Electric Log

West of the Edison field, Union Oil Co. is running electric log in its Smith No. 63-28- in Sec. 28-30s-29e, with hole bottomed at 4182 ft. Waechter No. 24-32 in Sec. 32-15s-17e in the San Joaquin area is only a location.

Terra Bella Try Gives Up

J. L. Smith and R. H. Larsen's Moore No. 1, a wildcat in Sec. 28-22s-27e in the Terra Bella area of Tulare County has ended its search for new oil in a depth of 1435 ft. in granite. Granite was topped at 1425 ft.

McLure Valley Wildcat Spuds

Group Oil Operations, Inc., Avenal No. 1 in Sec. 15-24s-17e in the McLure Valley area of Kings County has been spudded. Offsetting acreage holders include Severns Drilling Co.

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5. Furthermore, not one part lubricated with *Strona* showed any sign of breakdown during the entire 10 months—the first time in the line's history that this had happened. As a result, that airline and several others are now using *Strona* almost exclusively.

6. Naturally we're happy about this new product. But more important, we believe, are the *economic conditions* that inspired its development. Under anything but the American system of free, *competitive* enterprise we would never have had the *incentive* to put the time and effort we did behind *Strona* or behind the other product research we're continuing to do today.

UNION OIL COMPANY

OF CALIFORNIA

INCORPORATED IN CALIFORNIA, OCTOBER 17, 1890

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Coastal and Northern District

Orcutt Test Drills Ahead

Southeast of the Orcutt field in Santa Barbara County, Sunray Oil Corp. is preparing to deepen about 300 ft. its Los Flores No. 1 wildcat in Sec. 4-8n-33w. On formation test of the interval of 5270-5496 ft. the well showed an estimated 500,000 cubic ft. of gas daily and a little oil. Present depth is 5631 ft.

Chances of a new discovery at this location are considered good.

Montalvo Adds New Drilling

Between the McGrath discovery well and the intersection of Ventura Blvd. and Thompson Road, Standard of California is rigging to start the drill in Maxwell No. 1 in Sec. 23-2n-23w in the Montalvo area. It will be a deep test. McGrath No. 65-3 in Sec. 30-2n-22w is drilling at 7175 ft.

Conejo Try Oil Failure

Joseph Schuck's No. 2 test in Sec. 33-2n-20w in the Conejo area in Ventura County has been given up as a production failure at the comparatively shallow depth of 670 ft.

Half Moon Bay Test In View

E. T. Willard has staked location for Butts No. 1 in Sec. 22-6s-5w in the Half Moon Bay area of San Mateo County. Buckthorn Oil Co. found a little production in the area during 1886 in holes carried to the Pliocene and Miocene.

Nipomo Wildcat Making Progress

On a large block of acreage in the Nipomo area, Union Oil Co. is drilling at 2368 ft. with Vernon Wineman No. 2 in Twp. 11n, Range 33w, San Luis Obispo County.

Ojai Test Goes Down

Richfield Oil Corp.'s interesting exploratory hole in the Ojai area is drilling on down below 3400 ft. It is known as Ojai No. 45 and it lies in Sec. 13-4n-22w.

Simi Try Drilling

Union Oil Co.'s Canada de la Brea No. 4 in Sec. 32-3n-18w near a cluster of company wells on the Rancho Simi in Ventura County is drilling steadily ahead below 1200 ft. Location for Simi No. 9 has been staked in Sec. 18-3n-19w. In the West Mountain area, Henderson No. 1 in Sec. 23-3n-21w is standing with surface pipe set at 380 ft.

Ohio Grades Goleta Test

Ground is being graded for Ohio Oil Co.'s Thomas B. Bishop Co. No. 1, a prospect job in Sec. 7-4n-28w in the Goleta area, Santa Barbara County.

Oxnard Try Has Rig Up

Rig is up for Andrew Lucas' Pfeiler No. 1 in Sec. 1-1n-22w in the Oxnard Plains area, Ventura County. Drilling contract has been awarded to Abbott Jenks Drilling Co.

New Sespe Try Looms

Eagle Rcok Oil Co. of Fillmore is grading roads to drill a well in the Sespe area in Sec. 36-5n-20w. Luther Cox is superintendent of the company.

Zaca Try Inactive

After redrilling to 3836 ft. Tide Water Associated Oil Co. has suspended operations in Quati No. 1 in Sec. 34-8n-31w in the Zaca area, Santa Barbara County. The hole was first carried to a total depth of 4033 ft.

Goleta Wildcat Stages Blowout

Honolulu Oil Corp. is trying to regain circulation in its Honolulu-Signal-Macco-State No. 309-1 in Sec. 19-4n-28w in the Goleta area, after the well blew gas and was killed with heavy mud. Total depth is 3962 ft. No. 308-RDA in Sec. 24-4n-29w is making hole at 4190 ft. Honolulu-Signal-Goleta Comm. No. 1 in Sec. 24 is idle at 6741 ft.

West Mountain Wildcat Rigging

T. M. Gibson is rigging up to begin drilling Portillo No. 1 in Sec. 26-4n-21w in the West Mountain area, Ventura County. Meanwhile, D. D. Feldman, Operator, has completed Richardson Estate No. 3 in Sec. 23-3n-21s at 4690 ft. for an initial output of 116 barrels of oil and 100,000 cubic ft. of gas. Ring Oil Co. Synd. recently finished S. P. No. 1 in Sec. 23-3n-21w at 5592 ft. Yield is 80 barrels a day.

Snowball Mtn. Wildcat Going

Near the Ventura-Santa Barbara County line, M. T. Grubb, Operator, Snowball No. 1 in Snowball Mountain in Sec. 9-4n-24w, Ventura County, is drilling at 5549 ft. The project overlooks Carpinteria where as far back as 1857 Charles Morrell of San Francisco distilled oil from seepages abounding in the area.

King City Try Gives Up

In Thompson Gulch near King City, Shell Co. has abandoned Honolulu-Thorup-USL No. 1 in Sec. 4-20s-7e, Monterey County. The hole was carried to 6777 ft. in a vain effort to uncover new oil supplies.

Piru Creek Test Digging

Near Piru Creek, Bolsa Chica Oil Corp. is drilling at 3089 ft. with Bolsa Chica No. 76-32 in Sec. 32-5n-18w, Ventura County.

Cat Canyon Test Works

General Petroleum Corp. is preparing to wash perforations in Dominion No. 41-14 in Sce. 14-9n-33w in the Cat Canyon wildcat area. Total depth is 5071 ft. Casing is set at 3590 ft.

Bardsdale Well Good

W. H. (Bill) Geis has successfully completed Geis-Robertson No. 1 in Sec. 12-3n-20w in the Bardsdale field for 60 barrels a day from 5887 ft. Initial cut was about 20 per cent.

WeldELLS *have everything*

WIDEST RANGE
of types; sizes; thicknesses.
SEAMLESS
For greater strength
QUARTER-MARKED ENDS
Easier, more accurate fabrication.
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Never less than specification minimum.
REINFORCED HERE
More metal where the stress is higher.
MACHINE TOOL BEVEL
Best welding surface. Accurate bevel and land.
TANGENTS
Keep weld away from highest stress zone; simplify lining up.
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DOWN to the last detail WeldELLS are engineered to meet *all* requirements of *any* pipe welding job. They measure up to *all* requirements of pipe welding more fully than other fittings because they have designed into them features that are combined in no other make.

A number of these features are pointed out above. They give you the means of doing the job as *well* as it can be done —as easily, as rapidly, as economically as it can be done. This combination of features means extra value that is yours only in WeldELLS and other Taylor Forge fittings for pipe welding. Insist on the fittings that *"have everything"* . . . it pays!

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South Mountain Well Comes In

Texas Co. has completed S. P. No. 31 in Sec. 24-3n-20w in the South Mountain area for a current yield of 370 barrels of oil, cutting 5 per cent. Total depth is 4837 ft.

Dixon Gas Try Nears Completion

In the Dixon area of Solano County, Amerada Petroleum Corp. is giving the finishing touches to its Wineman Comm. No. 2 gas test in Sec. 22-6n-2w. Total depth is 5000 ft., with casing set at 4868 ft. Location has been staked for Marie Wineman No. 1 330 ft. north and 360 ft. west from the south quarter corner of the section.

Willows Test Goes

Near Willows, Butte County, General Petroleum Corp. is going steadily ahead at 6246 ft. with Llano Seco No. 1 in Sec. 33-20n-1w.

Winters Test Cements Pipe

Shell Oil Co.'s Szekeres No. 1 in Sec. 19-8n-1e in the Winters area of Solano County shot radio-active bullets at 5050, 5030 and 4980 ft. and now has cemented casing at 5103 ft. Hole is bottomed at 5118 ft.

Dunnigan Hills Wildcat Dropped

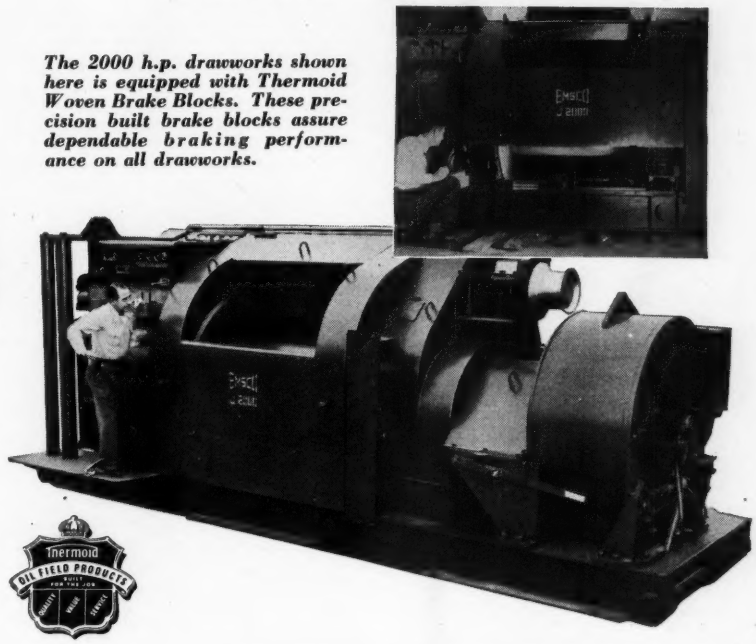
Having explored to a total depth of 4000 ft. without encountering anything of gas interest, Texas Co. has decided to drop Dunnigan Unit No. 2 in Sec. 26-11n-1w in the Dunnigan Hills, Yolo County, as a production failure.

Dominguez Job Running Tubing

Running tubing describes the present operational move in Union Oil Co.'s Hellman No. 58 in Sec. 27-3s-13w in the Dominguez area. The test went to a bottom of 11,330 ft. Intervals perforated are between 10,393-10,856 ft. and 10,690-10,668 ft.

To Handle a Half Million Pounds of Pipe in a Four Mile Hole . . .

The 2000 h.p. drawworks shown here is equipped with Thermoid Woven Brake Blocks. These precision built brake blocks assure dependable braking performance on all drawworks.



This drawworks will have to "stand the gaff" of extreme loads in working a 20,000 ft. hole. And the load will ride the brake blocks a great deal of the time.

For such service, the manufacturer wisely chose Thermoid Woven Brake Blocks. Thermoid Blocks give positive braking action without chucking or chattering. They are accurately sized and cured to exact shape, so as to fit the flange snugly. They are furnished with an exclusive expander sleeve, insuring tight blocks and perfect braking action right down to the bolts.

When You Buy Brake Blocks for Replacement

Remember, Thermoid blocks are *Packaged In Sets* for the machine you want to reequip. The blocks are correctly formed and jig drilled at the factory, from the builders' specifications for your machine, then packed in cartons (enough blocks for one band in each carton) in such a manner that the preformed radius cannot change in shipment. Each box is marked with the name and number of the machine for which they are intended . . . there's no chance for error. When Thermoid Blocks are used, relining time is reduced to a matter of minutes.

Thermoid serves the world-wide Oil Industry through hundreds of supply stores that distribute the products listed below.

Rotary Brake Blocks • Woven Oil Field Brake Lining • Drill Pipe Protectors • V-Belts and Drives • "No Wip" Line Saver • "Powerflex" Pressure Seal Rotary Hose • Slush Pump Hose • Oil Country Belting • Stuffing Box Rings • Wire Line Turn Back • Flexible Discharge Unit Hose • All Types of Production Hose • Tubing Protectors.

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Thermoid Company, Trenton, N. J., U. S. A.
Warehouses in Houston, Los Angeles, Wabash

Around the corner from *You*

In addition to fuel for transportation, home and industrial heating, the petroleum industry this year will bring the convenience and cleanliness of liquified petroleum gas to 3-million homes located beyond city gas mains. This relatively new service ultimately offers better living in 20,000,000 non-urban homes.

MOTHER NATURE applied the cookie jar technique to oil. Most of it, she hid away, out of easy reach. Yet, gasoline and oil are two of the most conveniently available commodities you buy —and low in price. The explanation lies, of course, in the marvelously efficient distribution system of the petroleum industry—comprising producers, refiners and marketers. All three use thousands of Super Power Whites. Correctly selected for the work they do, properly maintained and skilfully manned, they are *precision tools of transportation.* These three factors will increase the distribution efficiency of any truck-using business, large or small. They are the basis of The Continuing Control System of Truck Management, which our White Representative will gladly explain in terms of your own transportation requirements.

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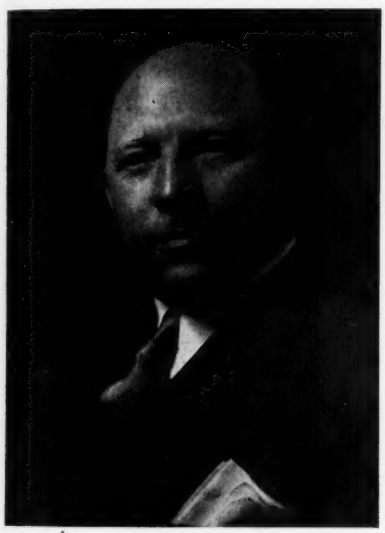
Personalities IN THE NEWS

Cranson Advanced to New Position With Honolulu

L. A. Cranson, recently advanced by the Honolulu Oil Corporation to a new position, created by the Board, of Executive Vice-President. Mr. Cranson remains a Director.



L. A. Cranson

In addition to the above, Mr. Thomas C. Moroney was elected Secretary of the Company, succeeding Robert H. Wright, who will retain his Vice-Presidency. Mr. Moroney has been with the Company for ten years, and has been handling legal work in the Company's San Francisco office.

Mr. Wright has served with the company since its start, and is past retirement age.

All other officers and directors were re-elected.

Newcomb D. Taylor, sales manager for Hancock Oil Co., has disclosed that currently there are 16.4 per cent more service stations in California retailing Hancock products than a year ago.

One of the last of the Signal Oil family to return to civilian pursuits from duty with the armed services is Bill Knoll. He entered the Army in January, 1941, as 1st. Lieut. in the infantry and was discharged as a major. Knoll is assistant to the instructor in the company's southern division training school.

James Sweetser Lawshe, 60, manager of the Huntington Beach Co. and long active in California oil development, died in his sleep at his residence, 415 Irving Blvd., Los Angeles.

A native of Indiana, Mr. Lawshe came to Los Angeles in 1914 and was prominent in the early organization of the Huntington Beach Co. Oil was found on the company's property in 1920.

F. A. Huff, Southern Counties Gas Co., spoke on "Texas Gas for California" at the meeting of the American Association of Petroleum Geologists at the Clark Hotel in Los Angeles.

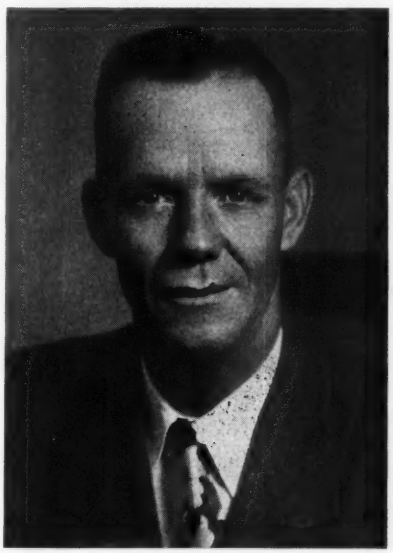
Fred C. Ripley, general manager of the Chanslor-Canfield-Midway Oil Co. will retire July 1 from active service. He has been with the company for 43 years and during his tenure C.C.M.O. accounted for a number of important California discoveries.

The son of E. P. Ripley, the late president of the Santa Fe Railway, the oil executive became manager of Oil Properties, Inc., shortly after the turn of the century. The company subsequently was taken over by C.C.M.O. He became manager of The Chanslor-Canfield organization in 1910.

Mr. Ripley recently was in attendance at the 50th anniversary of the founding of Shattuck Military School in Faribault, Minn., where as a youth he was a student.

Clyde Simpson Joins Pike Drilling Company

Clyde Simpson, graduate of Stanford University and well known to California oil operators, has been elected a vice-president of the Thomas P. Pike Drilling Company.



C. R. Simpson

Mr. Simpson began his experience in the oil business prior to 1930. Since 1935 he has been associated with Bell and Loffland, later Loffland Brothers where he was Assistant to A. S. "Doc" Hayes. He left his position with Loffland Brothers in March, 1947.

George Winterburn, Signal Oil & Gas Co. production department at Long Beach, won the low gross honors by shooting a 77 round at Signal's annual golf tournament at the Rio Hondo Golf Club. He was runner-up last year.

Out-of-towners in attendance at the tournament included Riley Staples, Seattle division manager; Al Burnham, Portland division manager, and Ken Fields, Signal commission distributor in Yakima, Wash.

Templeton, Lynch and Joiner Advanced by General Petroleum

Three major promotions have been announced by the General Petroleum Corporation. J. W. Templeton becomes Assistant to the Director of Production; W. C. Lynch is advanced to Assistant to the Manager of Industrial Relations and W. D. Joiner, Jr., replaces Mr.

J. W. Templeton

Lynch as Manager of the Personnel Department.

Mr. Templeton, a Stanford alumnus and, like his brother, the famous "Dink" Templeton, a former Stanford athlete, has been with General Petroleum more than 26 years, his entire business career having been spent with the company in various engineering capacities.

W. C. Lynch

W. D. Joiner Jr.

Mr. Lynch is a 31-year G. P. veteran and has headed the personnel department since 1929. Like Mr. Templeton, he hails from Stanford. Currently, Mr. Lynch is "kingfish" of the company's 20-Year-Club, which is composed of hundreds of men who have been with G. P. for that length of time.

Mr. Joiner entered the company's service in 1925 and, for the past ten years, has been assistant to the manager of production. A native San Franciscan, he attended the University of California.

Patterson-Ballagh Appoints Chief Chemist

Joe Larkin has been appointed chief chemist in charge of rubber research for Patterson-Ballagh, Division of Byron Jackson Co., manufacturers of Oil Field Rubber Specialties.

Mr. Larkin graduated from U.C. L.A. as a specialist in organic and biochemistry. During the war he was assigned to research for the War Department. Following the war, he served as chief chemist for L. A. Standard Rubber; later joining Sierra Rubber before taking over the Patterson-Ballagh rubber laboratory.

Kern Oil Announce Executive Changes

The Board of Directors of Kern Oil Company Limited, London, have announced the following official assignments:

Angus P. McEachern has been appointed Chairman of the California Management Committee, in which post he succeeds Roscoe W. Stephens. McEachern, a member of the California Bar, is California Counsel and Assistant Secretary of the Company.

R. Joe Stephens has been appointed a member of the California Management Committee. Stephens will continue as Kern's General Superintendent, in which capacity he has served for some years past.

Thomas Rothwell, Richfield Oil Corp., and Bill Holman and Harry Turver, Standard of California were among speakers making up an informal symposium on "Environmental Significance of Fossils" at the meeting of the Pacific Coast section, Society of Economic Paleontologists and Mineralogists at Hancock Hall, U.S.C.

Herbert J. McKinnon and Walter Parker of Los Angeles have joined forces in a wildcat play north of Poso Creek.

Glen M. Foster, newly elected secretary of the Standard Oil Company of California. He succeeds B. W. Letcher, who will devote his entire time to his duties as a vice-president. Foster has been with Standard 32 years and has been assistant secretary since 1931.

Ryerson Steel Holds Open House at Los Angeles Plant

Refreshments and dinner were served to visitors estimated to number about 4000 persons who attended the Open House held May 15 at the Los Angeles plant of Joseph T. Ryerson & Son, Inc., nationally known steel distributors. Hosts were F. A. Purdy, plant manager, and T. L. Kishbaugh, assistant manager. The new plant has been in operation since October, 1946.

Before dinner, which was served in a holiday like atmosphere in dining cars and in a large, decorated tent conveniently placed adjacent to the warehouse building, visitors toured the general offices and warehouses where members of the Ryerson organization were stationed to explain the company's methods of order handling, dispatching, storing, cutting and shipping steel.

Everett D. Graff, president, Harold B. Ressler, vice president and general manager of sales, Ainslie Y. Sawyer, assistant to the president, William Seymour, Jr., assistant vice president, and Thomas Z. Hayward, assistant general manager of sales, were among the Ryerson executives who were on hand to welcome guests.

The Los Angeles plant, twelfth in the Ryerson nation-wide system, is the first to be placed in operation on the West Coast. The warehouse building covers an area of some 200,000 square feet and is equipped with the latest and most accurate high speed types of cutting and handling machinery. It was engineered and designed to provide maximum efficiency in all operations involved in receiving, stocking, and shipping a wide variety of hot rolled, cold finished, reinforcing and specialty steels.

Promotion of Louis E. Conway, formerly general foreman in the Ventura division of Southern Counties Gas Co., to assistant division superintendent, has been announced by personnel manager Ludlow Shonnared. Conway entered gas company service in 1939. He was with the Santa Monica division until 1945 when he was transferred to Ventura.

Visitors registering at the Open House held May 15, 1947, at the Los Angeles plant of JOSEPH T. RYERSON & SON, Inc., steel distributors. Almost 4000 guests attended, said by officials of the company to be the largest group ever to assemble at a Ryerson steel-service plant.

Control of Unconsolidated Sands

(Continued from Page 5)

of 3/32" diameter and 15 or 20-mesh wire wrapped liners will not prevent sand trouble.

(3) Final conclusions as to results to be obtained with slots of less than .030" width cannot be arrived at due to the relatively short experience in most of the wells so equipped.

(4) Plugging of gravel packs and prepacks causes a more rapid decline in productive index than that which occurs when conventional liners are used.

(5) Greater economic returns during the early history are realized from gravel packed or prepacked wells designed to screen all sand due to ability to produce at higher rates without sand trouble and because of the lower production costs.

(6) Cost of remedial measures necessary for restoration of productivity in plugged gravel packed and prepacked wells will be no greater than the redrilling cost to be expected with conventional liners.

(7) Control of sand production through control of flow into the well has not been successful. Successful application would involve such low rates of production as to make it impractical under competitive conditions.

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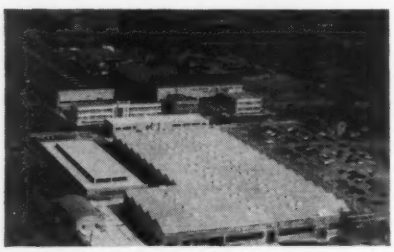
An abstract of a paper, under the same title, presented by Read Winterburn, development engineer, Union Pacific R.R. Co., at the Spring Meeting of the Pacific Coast District, Division of Production, American Petroleum Institute, Biltmore Hotel, Los Angeles, California, May 15-16, 1947.

New Byron Jackson Plant

Completed recently and now occupied, a new plant addition of the Byron Jackson Pump Division covering approximately 8 acres on the south side of Vernon Avenue, Vernon, California, supplants the present buildings on Slauson Avenue in Huntington Park, occupied since 1920.



Erected at a cost of over $1,500,000 and begun in January, 1946, the new addition includes an administration building, and provides for machine shops, stock room and warehouse, shop cafeteria, service and pattern shops, truck shed, garage and maintenance, and oil and paint storage.

The plant and shop structures were designed by the firm of Taylor and Taylor, and the office building by Albert B. Gardner of Los Angeles. The C. L. Peck Company, construction firm, built the plant. Various materials were used in the construction, including reinforced concrete, steel, brick and aluminum, with the monitor type roof over the shop areas.

All phases of the building operations were under the direction of Mr. Floyd C. Merritt, vice president of the Oil Tool Division.

"The new plant," said Mr. E. S. Dulin, president of Byron Jackson, "is one of the most modern and well equipped, and will result in the most efficient and economical operation."

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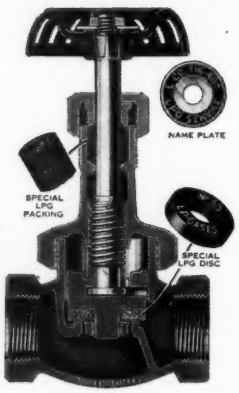
400 Lb. Pressure Valve For Liquefied Petroleum Gas Service

Designed for high pressure Liquefied Petroleum Gas service, the new "N - M - D" (Non - Metallic Disc) Bronze Valve is announced by The Lunkenheimer Company, Cincinnati 14, Ohio. Made in globe, angle and check patterns, sizes ¼" to 3", screw ends.

The valve is ruggedly constructed to safely withstand pressures up to 400 lb. W.O.G. Disc and stem packing are especially compounded for LPG service. Recommended for



use on liquefied petroleum gas systems, bulk transfer and storage tanks, domestic cylinder charging manifolds, vapor differential compressors and general industrial uses.

A back seat above the stem thread permits repacking the valve under pressure when wide open. Disc can be renewed with a minimum of time and trouble. All other parts of the valve are also renewable, if necessary.

All patterns are illustrated in Circular No. 576.

Conforms to "Liquefied Petroleum Gas Safety Orders" of the Division of Industrial Safety, Department of Industrial Relations, State of California.

Pictured are a few of the members at the recent San Francisco meeting of the Petroleum Equipment Suppliers Association.

THIS LAUGH

OFF!!

And there's the story about the man who spent a lot of money to rid himself of halitosis, only to find that his friends didn't like him anyway.

A young girl, seeing names like "Surrender" and "My Sin" on the perfume counter, timidly asked, "Don't you have anything for a beginner?"

Toast overheard at a fraternity banquet: "Here's to the land we love, and vice-versa."

Then there's the story about the Scotchman who spanked his children and put them out in the flower bed to cry.

"I hear," he said, hopefully, "that you have a propensity for petting."

"A dirty lie!" she cried, "All I have is a davenport."

George: They say you can tell a girl's character by her clothes.

Jackie: Oh, come now. Surely they have more character than that.

Then there was the fellow who rode in a cab with his girl. She was so beautiful he could hardly keep his eyes on the meter.

"Remember, darling, last night you said there was something about me you could love?"

"Yeah, but you spent it all."

A college education is what enables a fellow to get a job as secretary to a man who never went to school at all.

Boss (after dinner): "And now, my dear, how about a little demitasse?"

Blonde: "I knew it. You weren't treating me like this for nothing!"

Asked why he was going to marry a glamor girl from the city instead of some woman his own age, Grandpappy opined: "I'd a heap ruther smell perfume than liniment!"

Look out for the friendly gal
Who loves her beer and rye;
You may not know it, pal,
But she'll make you buy and buy.

Housewife: Look here, Nora, I can write my name in the dust on the table..

Nora: An' sure, ma'am it must be wonderful to have an education like that.

A Westerner entered a saloon with his wife and three-year-old boy. He ordered two straight whiskies.

"Hey, Pa," said the kid, "ain't mother drinking?"

The wise old bat said to the crazy young bat: "You are so screwey you must have people in your belfry."

"Was your uncle sensible until the last?"

"I won't know until his will is read tomorrow."

Binks: What's Mabel mad about?

Spinks: I understand she stepped on one of those scales with a loud speaker attachment and the thing called out, "One at a time, please."

Cowboy: Getting your saddle on backwards, aren't you?

Dude rancher: That's all you know about it, smarty. You don't even know which way I'm going.

Father: Don't you think our son got his intelligence from me?

Mother: He must have—I still have mine.

"Honey, aren't all these bills for the clothes you bought before we were married?"

"Yes, my sweet."

"But don't you think it's unfair to ask a fish to pay for the bait he was caught with?"

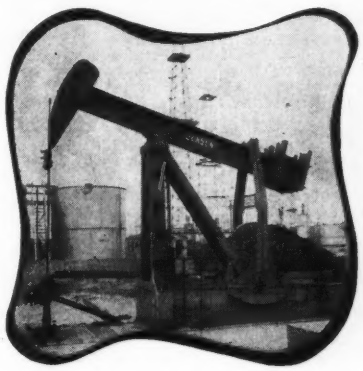
A necking party continues until someone gives in, gives up, or gives out.

Conductor: "How old are you, Little Girl?"

Little Girl from Boston: "If the company doesn't mind, I'd prefer to pay full fare and keep my own statistics."

Outstanding

FOR 27 YEARS



If you're a production man who has been around, you probably know Jensen Pumping Units very well. You already know they have been outstanding for 27 years.

Others who are not so familiar with Jensen will find them a good, rugged unit usually capable of reducing pumping costs on any well. Our entire line is conservatively described in literature available from your Jensen dealer or our home office.

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Carneros Creek Explorer Drills

Independent Exploration Co., Anderson No. 1 in Sec. 29-28s-20e in the Carneros Creek area is making hole ahead at 1725 ft. Bowles No. 66-17 in Sec. 17-29s-21e in the Cymric area is ready to start work.

Coalinga Try Cone Milling

Milling on cones is the current status of Robert S. Lytle, Operator, No. 58-34 test in Sec. 34-20s-15e in the Coalinga area. Total depth is 7335 ft. in shale.

Cuyama Test Spot Coring

Oil Well Abandonment Co. is spot coring at 2958 ft. with Cuyama No. 1 in Sec. 25-11n-26w in the Cuyama area, San Luis Obispo County. McKee and Womack's Cuyama Rancho No. 1 is a location in the section.

Orange County Tries Prospect

Morton and Sons, Irvine No. 174-1 in Sec. 10-6s-8w near El Toro in Orange County is going ahead at 453 ft. Irvine No. 55-1 in the Corona Del Mar area is drilling at 8336 ft.

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The American Gas Association has just made public figures on demand for natural and manufactured gas in the United States during March, which exceeded the send-out for a comparable period last year by more than 21 per cent.

Natural gas sales for March, 1947 were 2,509,000,000 therms, manufactured gas sales, 233,000,000 therms, and mixed gas, 185,000,000 therms.

California, which has more of everything than anywhere else, topped all other states in the consumption of gasoline in 1946, a year which established an all-time record, according to the Public Roads Administration of the Federal Works Agency.

Californa's gasoline consumption during 1946 was 2,436,430,000 gallons. This was a rise of 626,193,000 gallons or 34.6 per cent above the 1945 figure.

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